

STUDIES IN BIGNONIACEAE 26: NEW TAXA AND
COMBINATIONS IN NORTHWESTERN SOUTH AMERICAN BIGNONIACEAE

Alwyn H. Gentry*
Missouri Botanical Garden

My on-going studies of neotropical Bignoniaceae have turned up five undescribed taxa of this family from western Ecuador and adjacent Peru. Several new combinations in the family are also proposed as a result of taxonomic insight gained from field work in northwestern South America.

AMPHILOPHIUM ECUADORENSE A. Gentry, sp. nov.

Frutex scandens; ramuli hexagoni, pilosi, sine consociibus glandularum in nodis inter petioles; pseudo-stipulae foliaceae; folia 2-foliolata, interdum cirrhis fissis, foliolis ovatis, membranaceis, subtus dense puberulis; inflorescentia floribus in panicula angusta, villosa; calyx duplex, pubescens; corolla rubra, tubulosa, valde bilabiata; stamina didynama, thecis divaricatis; ovarium ovato-cylindricum, dense puberulum; discus annulo-pulvinatus; capsula elliptica, rasilis, dense molliter tomentosa.

Liana; branchlets sharply hexagonal with ribbed angles, pilose, especially on the angles with simple or short-branched dendroid yellowish trichomes, these less than 1 mm long, interpetiolar glandular fields lacking; pseudostipules foliaceous, persistent, to 0.8 mm in diameter. Leaves 2-foliolate, sometimes with a trifid tendril, the leaflets ovate, acute, cordate at base, 4-12 cm long, 2.5-12 cm wide, membranaceous, palmately veined at base, densely and uniformly yellowish-puberulous beneath with short dendroid trichomes, above less densely puberulous with short simple and forked trichomes; petiolules 1-4 cm long, petioles 2-6 mm long, villous with short-branched dendroid trichomes. Inflorescence a rather narrow panicle, villous with yellowish mostly dendroid trichomes, bracteate with linear or lanceolate bracts 0.5-1 cm long. Flowers with calyx double, the inner calyx irregularly 2-labiate, outer calyx irregularly 5-lobed, lepidote and yellowish-pubescent with simple, forked and dendroid trichomes, the latter mostly branched only at tips, 9-11 cm long, 10-11 cm wide;

* This work was supported by National Science Foundation Grants GB-40103, OIP75-18202 and DEB 75-20325-A01.

corolla magenta, tubular, bilabiate, 2.5-3 cm long, ca. 1 cm wide, the upper 2 lobes thick, almost completely fused, the lower 3 fused, ca. 5 mm long, the tube split ca. half its length, viscid, glabrous; stamens didynamous, the anther thecae divaricate, 2 mm long; ovary ovate-cylindrical, slightly contracted at base, 2 mm long, 2 mm wide, densely pubescent with forked and branched trichomes, the ovules many-seriate in each locule; disc annular-pulvinate, 1 mm long, ca. 3 mm wide. Capsule elliptic, flattened, 9 cm long, 4.2 cm wide, the midline not evident, smooth-surfaced, densely and softly viscid tomentose with forked and stellate trichomes, also lepidote; seeds not seen.

Type: ECUADOR: Guayas: dry tropical forest, Cerro Bella Vista near Julio Moreno, 29 Aug 1965, Játiva & Epling 974 (holotype NY, isotype S).

Endemic to the coastal dry forest region of Ecuador and adjacent extreme northwestern Peru below 1500 m altitude.

Additional collections examined: ECUADOR: Manabi: near Jipijapa, 19 Jul 1942, Haught 3399 (F, K, US). El Oro: vicinity of Portovelo, 6-15 Oct 1918, Rose & Rose 23378 (US); Río Amarillo upstream from Portovelo, 640-760 m, 22 Aug 1943, Steyermark 54023 (NY); trail between Portovelo and Río Cabra passing Minas Nuevas, 640-1645 m, 23 Aug 1943, Steyermark 54078 (NY). PERU: Tumbes: entre Palamble y Faique, monte baja, 1400-1500 m, 2 May 1955, Ferreira et al. 10896 (MO, USM).

This species is more densely pubescent than any of the forms of highly variable A. paniculatum (L.) HBK. It also differs from A. paniculatum in its persistent pseudo-stipules and especially the viscid yellowish-tomentose fruit. I have previously identified several flowering collections of A. ecuadorensis with A. pannosum (DC.) Bur. & K. Schum. which is similar in its dense pubescence and persistent pseudostipules but has a very different rugose-tuberculate fruit and is also ecologically distinct in being restricted to wet forest habitats.

DELOSTOMA GRACILE A. Gentry, sp. nov. - Fig. 1.

Arbusto; ramuli subteretes; folia simplicia, obovata, apiculata, plus minusve integra, fere glabrata; inflorescentia floribus in racemo angusto gracili; calyx cupulatus, simplex; corolla carnea, peranguste tubulo-campanulata, extus sparsim minute puberula; stamina stigmaque exserta; capsula ignota.



Fig. 1. Delostoma gracile A. Gentry. A. Habit; B. Inflorescence with mature buds (part of largest bud removed to show position of anthers); C. Inflorescence with young buds; D. Flower (note exserted stigma; anthers broken off). (All x 1/3).

Shrub 6 m tall, branchlets subterete to somewhat angulate, puberulous, the nodes without interpetiolar glandular fields or pseudostipules. Leaves simple, obovate, apiculate, rounded at base, 3-9.5 cm long, 1.5-5.5 cm wide, the margin subentire or serrate towards apex, somewhat 3-veined from base, more or less glabrate above and below, membranaceous to chartaceous, sparsely puberulous along main veins below, with plate-shaped glands in axils of basal lateral nerves below, petiole 0.5-3 cm long, puberulous. Inflorescence an open few-flowered terminal raceme, slightly puberulous, pedicel pairs separated by about 2 cm, the pedicels ca. 1 cm long. Flowers with the calyx cupular, simple, evenly 5-dentate, 6-7 mm long, 6 mm wide, sparsely puberulous with scattered trichomes; corolla "flesh-color", very narrowly tubular-campanulate, 6 cm long, 0.9 cm wide at mouth of tube, the tube 4.5 cm long, the lobes long and narrow, 1-1.3 cm long, 5-6 mm wide, sparsely and minutely puberulous outside, the lobes inside glabrous but glandular-surfaced; stamens exserted, the anther thecae parallel, pendent, 3.5 mm long; pistil ca. 6 cm long, stigma long-exserted, style sparsely pilose, ovary and disc not seen. Fruit not seen.

Type: PERU: Tumbes: Prov. Tumbes, mountains SE of Hacienda La Choza, 900-1000 m, deciduous bushwood, 27-28 Feb 1927, Weberbauer 7683 (F, fragm. MO).

This plant differs from other species of the genus especially in its slender open inflorescence, narrow thin-textured corolla tube, long narrow corolla lobes, exserted stigma and anthers, and small simple unridged calyx. The flesh-colored flowers are unique if correctly reported. Its closest relative is D. lobbii Seem., the only other Delostoma with exserted anthers and a similar corolla shape. That species differs in the inflorescence reduced to one or two flowers, a larger (11-20 mm long) calyx with prominent submarginal lobes, red flower color, and different habitat (1550-3250 m). Delostoma gracile has the smallest calyx in the genus and is the only species occurring below 1500 m, and the only one with an open slender inflorescence.

PACHYPTERA ERYTHRAEA (Dugand) A. Gentry, stat. nov.

Pachyptera kerere var. erythraea Dugand. Caldasia 7: 16. 1955. Type: Colombia: Santander, Romero-Castañeda 4727 (COL).

Only a single specimen of this taxon was available to Dugand when he described it as merely a variety of widespread

P. kerere, distinguished mostly by its red (rather than white) flowers but also by the wider corollas. I have studied both species in the field and the numerous additional specimens now available confirm that the red-flowered plant endemic to the middle Magdalena Valley of Colombia merits species recognition. In addition to the different flower color and larger corolla dimensions noted by Dugand, its anthers are exserted or subexserted rather than included. The calyx of the Magdalena Valley plant is evenly truncate and cupular while that of P. kerere is irregularly sub-bilabiate to unevenly truncate and broadened gradually toward the apex. Moreover the corolla of P. erythraea is shaped quite differently from that of P. kerere. The former's corolla tube expands above the short basal constriction to become tubular campanulate from well below the middle, while the corolla tube of P. kerere expands relatively gradually near the middle above a much longer tubular base; diameter at middle of the tube in P. kerere is 3-7 mm, in P. erythraea (9-)11-15 mm (fig. 2). Vegetatively P. erythraea is distinguished from P. kerere by the (usually) densely puberulous leaf undersurfaces (of all specimens examined, only the type collection is glabrescent). The fruit of P. erythraea, like that of P. kerere var. incarnata (Aubl.) A. Gentry, is flat, without a visible midline and has thin, winged seeds. P. kerere var. incarnata, which sometimes has light magenta (but never red) corollas, has glabrous leaves and flowers of the size and shape of typical P. kerere, and is best maintained as a variant of P. kerere.

TABEBUIA BILLBERGII ssp. AMPLA A. Gentry, ssp. nov.

Differt ab T. billbergii ssp. billbergii calyce majore, corolla majore, ovario majore, et capsula latiore.

Similar to typical T. billbergii except in the markedly greater size of its calyx, corolla, and ovary and the wider capsule (see Table 1).

Shrub or tree 3-12 m tall, twigs terete, glabrate. Leaves palmately 5-foliolate, the leaflets narrowly ovate, acute to acuminate, the base rounded, the leaflets to 10 cm long and 5 cm wide, usually smaller, the terminal largest, laterals smallest, entire or subentire, chartaceous, inconspicuously scattered lepidote above, rather densely minutely lepidote below, above glabrate or simple puberulous along midvein, below mostly glabrate, usually with a few simple trichomes around margins of domatiate nerve axils, drying olive gray to black; petiolules to 2.5 cm long, laterals shorter, petiole to 6 cm long, thin,

inconspicuously lepidote and puberulous to glabrate. Inflorescence several (2-8) flowers clustered at the end of a branchlet, the pedicels to 1 cm long, densely tannish tomentose, the resting buds sessile, tannish mealy pubescent, bracts and bracteoles not apparent. Flowers with the calyx campanulate, 5-dentate, (8-)9-15 mm long, 7-12 mm wide, pubescent with pale tannish thick-stellate trichomes, these dense at base and along the 5 ribs, descending from the marginal teeth, the often contrasting brownish or blackish calyx surface visible toward margin between the ribs; corolla lemon yellow with reddish or brownish striations in throat, tubular-infundibuliform, 6-8 cm long, 1.4-2 cm wide at mouth of tube, the tube 3.5-4.5 cm long, the lobes 1.3-2.5 cm long, glabrous outside, inside pubescent with rather scattered long multicelled trichomes mostly along throat ridges; stamens inserted 5-6 mm from base of corolla tube, the filaments 1-1.8 cm long, the anther thecae divaricate, 2-3 mm long, the staminode 2-3 mm long; pistil 2.5-3 cm long, the ovary linear, 5-6 mm long, 1-1.5 mm wide, densely lepidote, the ovules 2-seriate in each locule; disc pulvinate, 0.5 mm long, 3 mm wide. Capsule linear-oblong, subterete, 17-29 cm long, 8-10 mm wide, scattered lepidote, sometimes also minutely and very inconspicuously puberulous, drying dark; the seeds thin, bialate, 0.5-0.6 cm long, 1.2-1.7 cm wide, the wings hyaline-membranaceous, sharply demarcated from body of seed.

Type: ECUADOR: Guayas: 1 km E of turnoff to Julio Moreno on Guayaquil-Salinas toll road, 30 Oct. 1974, Gentry 12243 (holotype MO, isotypes QCA, S)

Dry forest of coastal Ecuador and adjacent Tumbes, Peru.

Additional collections examined: ECUADOR: Guayas: Isidro Ayora, 12 Sep 1955, Asplund 17607 (NY, S); W. of Guayaquil, 18 Oct 1955, Asplund 18194 (S); outskirts of Pedro Carbo, 29 Oct 1974, Gentry 12236, 12237 (both MO); 1 km E of Isidro Ayora, 29 Oct 1974, Gentry 12239, 12240 (both MO); 32 km E of Cerecita on toll road to Guayaquil, 29 Oct 1974, Gentry 12241 (MO); 20 km of Cerecita ca. 7 km E of Changón, 30 Oct 1974, Gentry 12252 (MO); 3 km N of Guayaquil, Little 6568 (F); between Guayaquil and Salinas, Mexia 6758 (F); near Guayaquil, Mille 86 (F); coastal plain SE of Guayaquil, Rimbac 62 (F); Guayaquil, Nov. 1963, Valverde 931 (MO). PERU: Tumbes: Prov. Tumbes, Ricaplaya, valley of Tumbes river, 100-150 m deciduous bushwood, 4-5 Mar, 1927, Weberbauer 7734 (MO, NY). Prov. Zarumilla, 80-100 m alt, 18 Feb 1960, Ferreyra 14158 (MO, USM); Papayal, 105 m alt., open thickets, 19 Feb 1976, Plowman 5503 (MO).

As currently understood T. billbergii has a remarkably disjunct range, occurring along the Caribbean coast of Venezuela and Colombia and in the dry coastal forest of southwestern Ecuador and adjacent Peru. In the process of preparing treatments of Bignoniaceae for both the Flora of Venezuela and the Flora of Ecuador, I have examined numerous herbarium specimens of T. billbergii and studied it in the field in both parts of its range. Numerous constant but rather minor differences prove to exist between the two populations. These differences, correlated with a large range disjunction, support taxonomic recognition for the Ecuadorian plant. However none of these differences, mostly related to the greater flower size of the Ecuadorian taxon, seem especially significant and subspecific recognition seems appropriate.

Table 1--Differences between T. billbergii ssp. billbergii and ssp. ampla

	ssp. <u>billbergii</u>	ssp. <u>ampla</u>
range	northern Colombia and Venezuela	southwestern Ecuador and adjacent Peru
calyx length	5-8 mm	(8-)9-13 mm
calyx width	4-9 mm	7-12 mm
corolla length	3-5.5(-7) cm	7-12 cm
tube width	1-1.4 cm	1.4-2 cm
pistil length	1.7-2.3 cm	2.5-3 cm
ovary length	3-5 cm	5-6 cm
ovary width	0.7-0.8 mm	1-1.5 mm
leaf indumentum	slightly lepidote	densely impressed- lepidote
leaflet margin	mostly serrate	always entire
capsule length	14-23 cm	17-29 cm
capsule width	5-7 mm	8-10 mm

TABEBUIA CHRYSANTHA ssp. PLUVICOLA A. Gentry, ssp. nov.

Tecoma grandis Appun, Behand. Samereien und Pflanzen
39. (1858), nom. nud.

Differt ab T. chrysantha ssp. chrysantha calyce majore
minus puberulo et capsula majore plus minusve glabrescenti.

Tree to 30 m tall, small buttresses to 2 ft tall, the bark rather smooth; branchlets subtetragonal, stellate rufescent when young, more or less glabrescent. Leaves palmately 5(-7) foliolate, the leaflets elliptic to oblong obovate, acute to short-acuminate, obtuse to truncate at base, the terminal leaflet to 25 cm long and 14 cm wide, in laterals progressively smaller, entire at maturity, membranaceous, more or less glabrescent above, usually more or less stellate puberulous along main veins and often sparsely lepidote, below more or less persistently stellate pubescent at least along main veins and usually sparsely over surface; terminal petiolule 3-8 cm long, laterals shorter, petiole 6-30 cm long, stellate-rufescent to glabrescent. Inflorescence a contracted terminal panicle, often almost fasciculate, stellate-rufescent, bracts and bracteoles usually 3-4 mm long. Flowers with the calyx campanulate, 5-lobed, the lobes usually more or less reflexed, (12-)14-19 mm long, 9-19 mm wide, shortly reddish brown stellate pubescent, the tomentum denser toward base; corolla tubular-infundibuliform, 6-11.5 cm long, yellow with reddish penciling in throat, the venation (dried) reticulate to margins of lobes, the dried tube and lobes indistinguishable in color, the tube 4-8 cm long, 1.8-3 cm wide at mouth of tube, the lobes 1.5-3 cm long, glabrous outside except a few stellate trichomes along main veins of lobes and upper part of tube, the sinuses and floor of throat rather densely pilose with long simple trichomes inside; stamens didynamous, inserted 5-6 mm from base of corolla tube, the anther thecae divaricate, 2-3 mm long, the filaments 1.5-2.5 cm long, the staminode 8-11 cm long; pistil 3-3.9 cm long, the ovary linear-oblong, 4-8 mm long, 1.5-2 mm wide, densely minutely lepidote to apparently glabrous; disc annular-pulvinate, 1 mm long, 3-5 mm wide. Capsule linear-cylindric, 30-80 cm long, 1.5-2.4 cm wide, usually almost completely glabrescent; seeds thin, bialate, 0.6-0.9 cm long, 2.5-3.4 cm wide, the hyaline-membranaceous wings well-demarcated from seed body.

Type: ECUADOR: Pichincha: 17 km E of Santo Domingo de los Colorados, 800 m, 1 Feb 1974, Gentry 9505 (holotype MO, isotypes QCA, S, GB).

Mostly restricted to Holdridge-system wet forest from Costa Rica to the coastal cordillera of northern Venezuela and south along both sides of the Andes to Ecuador.

Additional collections examined: COSTA RICA:

Alajuela: near Villa Quesada, Gentry 470 (MO, WIS); Seibert 1602 (MO, US). Heredia: La Selva, Opler 484, 893 (both MO); near La Virgen, Gentry 525, 526 (both MO, WIS); near Puerto Viejo, Gentry 529 (MO, WIS), Gentry 1031, 1173, 1181 (all MO), Little & Budowski 20386 (CR). PANAMA: Canal Zone: Pipeline road, premontane wet forest area, Gentry 1795 (MO). Coclé: above El Valle de Antón, 1000 m, Gentry 5681 (MO). Colón: ca. 20 miles E of Canal Zone on Santa Rita Ridge road, Gentry 456 (MO). Darien: Cerro Pavarando, Gentry 4211 (MO); Cerro Pirre, 500-1000 m, Gentry 4584, 4611 (both MO); Cerro Mali, 1400 m, Gentry & Mori 13825 (MO). Panama: El Llano-Carti Road 4.8 miles N of Pan-Am Highway, Gentry 5074 (MO). Veraguas: 3.5-4.5 mi above Santa Fé, Gentry 3082 (MO). VENEZUELA: Aragua: Rancho Grande, 800-1100 m, Pittier 15284 (US, VEN); Maracay-Choroni, 1200 m, Tamayo 1619 (VEN, not US); Rancho Grande, 1080 m, Williams 10334 (F, VEN). Lara: San Isidro, Guarico, selvas nubladas, Tamayo 3358 (VEN). Merida: abajo del Trampa, 2000 m, Bernardi 2168 (K, NY); 20 km W of Merida, 1700 m, Breteler 3239 (NY, U, US, VEN); 35 km NW of Merida 1150 m, Breteler 3493 (MER, NY, U); 10 km O de Ejido, Little 15235 (VEN); between Merida and La Punta, 1520-1820 m, Steyermark 55926 (F, K, VEN). COLOMBIA: Choco: Panama border near Cerro Tacarcuna, 1200 m, Gentry & Mori 13751 (MO); Alto de Buey, ca. 1200 m, Gentry & Forero 7308 (COL, MO). Boyaca: E of Chapón, 100 mi NW of Bogota, 4000 ft, Lawrence 124 (F). Cundinamarca: cercanias de San Bernardo, 1800-1600 m, Cuatrecasas 9620 (F). Valle: Tulua, 1024 m, Moreno & Gonzalez 7 (COL, MO). ECUADOR: Esmeraldas: 2 km N of Quinindé, Gentry 9568 (MO), 2 mi W of Río Quinindé from Quinindé, Little 6211 (NY, US). Pichincha: 17 km E of Santo Domingo de los Colorados, 800 m, Gentry 10222 (MO, fruits of same tree as type). Manabi: 21 km S of Jipijapa on road to Guayaquil, 23 km N of Cascol, 370 m, Gentry 12214, 12219 (both MO). Bolivar: Valle de Limón, Cordillera Occidental, 800 m, Acosta Solis 6451 (F). Guayas: 2-4 km W of Bucay, 170 m, Oct 1974, Gentry 12319 (MO). Napo: 44 km E of El Chaco, 1400 m, Nov 1974, Gentry 12408 (MO).

Tabebuia chrysantha is a widespread and variable species. I have realized for some time that two forms of this species are readily distinguishable in the herbarium--one with short calyces pubescent with longer trichomes, in part barbate, the other with large calyces having a less dense shorter-stellate tomentum. While these two forms

are clearly distinct any attempt at taxonomic recognition has seemed inadvisable due to the absence of type material of Jacquin's Bignonia chrysantha and the problem of definitely assigning the type illustration to either of them. However recent study of this complex in Venezuela shows that only forms with shorter more pubescent calyces reach Caracas, the type locality of Bignonia chrysantha. In Venezuela the large calyxed form is restricted to montane cloud forest habitats from Rancho Grande (Aragua) west. It is thus undescribed except for the nomen nudum listed above. Interestingly Pittier (in herb.) considered the cloud forest plant specifically distinct but failed to validate a name for it.

Calyx size is not the only differentiating characteristic of this plant: its fruit is smooth and almost completely glabrescent as well as being larger than the distinctly stellate tomentose often striate or rough-surfaced one of typical T. chrysantha. Moreover typical T. chrysantha is restricted to lowland moist and dry forest habitats and is thus ecologically isolated from the wet forest plant. For example at Rancho Grande National Park, Venezuela, ssp. chrysantha occurs in moist forest up to 700 m while ssp. pluvicola occurs only in cloud forest over 800 m. Similarly in Ecuador ssp. chrysantha occurs only in the coastal dry forest while ssp. pluvicola occurs in lowland wet and moist forest; only in Esmeraldas Province do their distributions overlap and there ssp. chrysantha is restricted to a small dry forest enclave near the coast while ssp. pluvicola is widespread in moist and wet forest regions. The correlated differences in fruit, calyx, and ecology between these two forms of T. chrysantha suggests their taxonomic separation at least at subspecific rank.

Additional collections of the complex from throughout its range are needed and might well lead to elevation of ssp. pluvicola to specific rank. Although a widespread well-known locally common and commercially important tree which is exceedingly conspicuous when in flower, it is amazingly poorly represented in herbaria. The situation in Panama may be cited to support this point (as well as to emphasize the general lack of adequate herbarium representation of neotropical tree species, especially wet forest ones). Tabebuia chrysantha ssp. pluvicola occurs throughout Panama's wet forest regions (including such easily accessible ones as El Valle, Santa Fe, El Llano-Carti, Pipeline Road, and Santa Rita Ridge) but I am the only one who has ever collected it anywhere in the country. More fruiting specimens especially are needed before the relationship of ssp. pluvicola and ssp. chrysantha can be thoroughly understood.

TABEBUIA CHRYSANTHA ssp. MERIDIONALIS A. Gentry, ssp. nov.

Differt ab T. chrysantha ssp. chrysantha calyce majore et foliolis plus dense pubescentibus, ab T. chrysantha ssp. pluvicola calycis trichomatibus longioribus et foliolorum tomento.

Tree to 20 m tall and 50 cm dbh, bark very pale, smooth with longitudinal cracks. Branchlets subtetragonal, densely tannish-stellate pubescent when young, glabrescent. Leaves palmately 5-foliolate, the leaflets elliptic, acute, obtuse at base, entire, densely stellate and dendroid pubescent beneath, with tufts of similar but longer trichomes in nerve axils beneath, partially glabrescent above, drying tannish below (cf. T. ochracea), petioles and petiolules lepidote and stellate and dendroid pubescent. Inflorescence a contracted terminal panicle, the branches stellate pubescent, the bracts conspicuous, linear, 5-12 mm long. Flowers with the calyx campanulate, irregularly 5-lobed, 15-20 mm long and 9-12 mm wide, pubescent with reddish-tan stellate and dendroid trichomes; corolla tubular-infundibuliform, ca. 6 cm long and 2 cm wide at mouth of tube, glabrous outside except for a few long lax simple trichomes on and just below the lobes, inside with the sinuses pilose, densely pilose in floor of throat and at stamen insertion; stamens didynamous, the thecae 3-4 mm long; ovary linear-oblong, glabrous, 5 mm long, 1.5 mm wide; disc annular-pulvinate, 1 mm long, 2.5 mm wide. Fruit unknown.

Type: ECUADOR: Chimborazo: Canyon of the Río Chanchan, 5 km N of Huigra, 5000-6500 ft., moist forest valley in the afternoon fog belt; trees to 20 m high, 0.5 m diameter, this species is exceedingly floriferous and easily the showiest of the forest trees of the region at this season, 19-28 May, 1945, Camp E-3458 (holotype MO, isotypes F, K, NY, U).

Apparently restricted to isolated patches of Holdridge system premontane humid forest from 1200-2000 m on the slopes of the western Andes in southern Ecuador.

Additional collections examined: ECUADOR: El Oro: Camino de Zaruma a Malvas, 1200 m, 13 Sep 1947, Espinosa 2241 (K); between Portovelo and El Tambo, 2 Sep 1923, Hitchcock 21290 (NY); vicinity of Portovelo, 6-15 Oct 1918, Rose & Rose 23443 (NY); loc. ignon., Steyermark 54007 (K).

This is the southernmost representative of the wide-spread and polymorphic T. chrysantha complex. Vegetatively ssp. meridionalis is more like T. ochracea (Cham.) Standl.

(especially T. ochracea ssp. neochrysantha) than like typical T. chrysantha in the dense tannish tomentum of the leaf undersurface. However, flowering collections are very similar to T. chrysantha ssp. pluvicola and prove the affinity of this taxon with T. chrysantha. The leaves of some collections of T. chrysantha ssp. chrysantha from coastal Ecuador approach ssp. meridionalis in density of pubescence, but calyces of these lowland plants are much smaller than in ssp. meridionalis.

As is so often the case in Tabebuia, there are problems in determining which flowering collections are conspecific with which vegetative or fruiting collections. Sandwith (in herb.) identified flowering collections of ssp. meridionalis as T. spectabilis (Pl. & Lind. ex Pl.) Nichols. and vegetative material (doubtfully) as T. heteropoda (DC.) Sandw. (i.e. T. ochracea sensu lato). However I strongly suspect that all the upland material from southwestern Ecuador represents a single taxon with a unique combination of vegetative and floral characters. Flowering material of ssp. meridionalis is intermediate between ssp. pluviatilis and poorly known T. spectabilis of the northern Cordillera Oriental of Colombia which suggests that T. spectabilis itself may also prove an extreme variant of T. chrysantha. Alternatively it is possible that additional collections, especially of flowers, fruits and leaves from the same plant, would justify elevation of some or all of these geographical segregates to specific rank.

SPATHICALYX DUCKEI (A. Samp.) A. Gentry, comb. nov.

Tanaecium duckei A. Samp., Ann. Acad. Bras. Sc. 7:
125. 1935. Type: Brazil, Para, Obidos, Ducke s.n.
(MG 17137) (K, MO, RB, US).

Spathicalyx kuhlmannii J. C. Gomes, Mus. Nat. Hist.
Nat. Paris 15: 222. 1956. Type: Brazil, Rio de
Janeiro, Sumare, Kuhlmann s.n. (RB 77623) (K, MO,
RB).

Examination of the types of Tanaecium duckei and Spathicalyx kuhlmannii, two (presumably) hawk moth-pollinated Brazilian species shows that they are not only congeneric but apparently conspecific as well. Sampaio's original description of this plant in Tanaecium was tentative and I regard such major differences as long membranaceous subspathaceous calyx, gland-tipped, sometimes forked vegetative trichomes, trifid tendrils, very finely reticulate pollen, and cordate (to truncate) more or less palmately veined leaflets as outweighing the similarity

of the elongate tubular white corolla with that of Tanaecium. The only other genus of Bignoniaceae with a similar corolla is monotypic Leucocalantha which seems no more closely related to this plant than does Tanaecium. Gomes's monotypic genus is justified and the new combination proposed above is unavoidable.

In addition to the two types cited above I have seen recent collections of this species from Amazonian Colombia (Amazonas: Leticia, Gentry 12705A (MO)) and Brazil (Amazonas: Km. 130-150, Manaus-Caracarai Road, Gentry 12986 (INPA, MO); Tapuruquara, Prance et al. 15830 (MO); Para: Campus of IPEAN, Belem, Gentry 13085 (MO)). Spathicalyx duckei turns out to be a widespread species occurring through most of lowland Amazonia.

SPATHICALYX XANTHOPHYLLA (DC.) A. Gentry, comb. nov.

Tabebuia xanthophylla DC., Prodr. 9: 214. 1845. Type: Brazil, Amazonas, Martius 2967 (M (7 sheets), G-DC).

Phryganocydia xanthophylla Mart. ex DC., Prodr. 9: 214. 1845. nom. nud., pro syn.

Arrabidaea xanthophylla (DC.) Bur. & K. Schum., in Mart., Fl. Bras. 8(2): 70. 1896.

Xylophragma xanthophylla ("Bur. & K. Schum.") Macbride, Field Mus. Nat. Hist., Bot. Ser. 13(95): 65. 1961.

Generic affinity of this remarkable plant, which differs from all other species of Bignoniaceae in its bright yellow upper leaves, has never been satisfactorily established. Originally placed in Tabebuia, a then heterogeneous hodgepodge defined by a bilabiate calyx, it is now known to be a member of the predominantly lianous Bignoniaceae. Following Bureau & K. Schumann (1896-97), it is generally placed in Arrabidaea from which it differs in such important features as trifid tendrils, yellow flowers, 4-many-seriate ovules, palmately 5-7-veined leaflets and the presence of peculiar orangish glands on the leaves and outside of the corolla tube. Other somewhat unusual features for Arrabidaea include a membranaceous bilabiate calyx, subulate (though small) pseudostipules, dendroid vegetative trichomes, complete absence of 3-foliolate leaves, and a dendroid-pubescent fruit lacking a visible midline. Macbride's placement in Xylophragma is no improvement as that genus shares such characteristics of Arrabidaea as simple tendrils, purple flowers, a cupular, 5-denticulate calyx and blunt pseudostipules; the fruit of

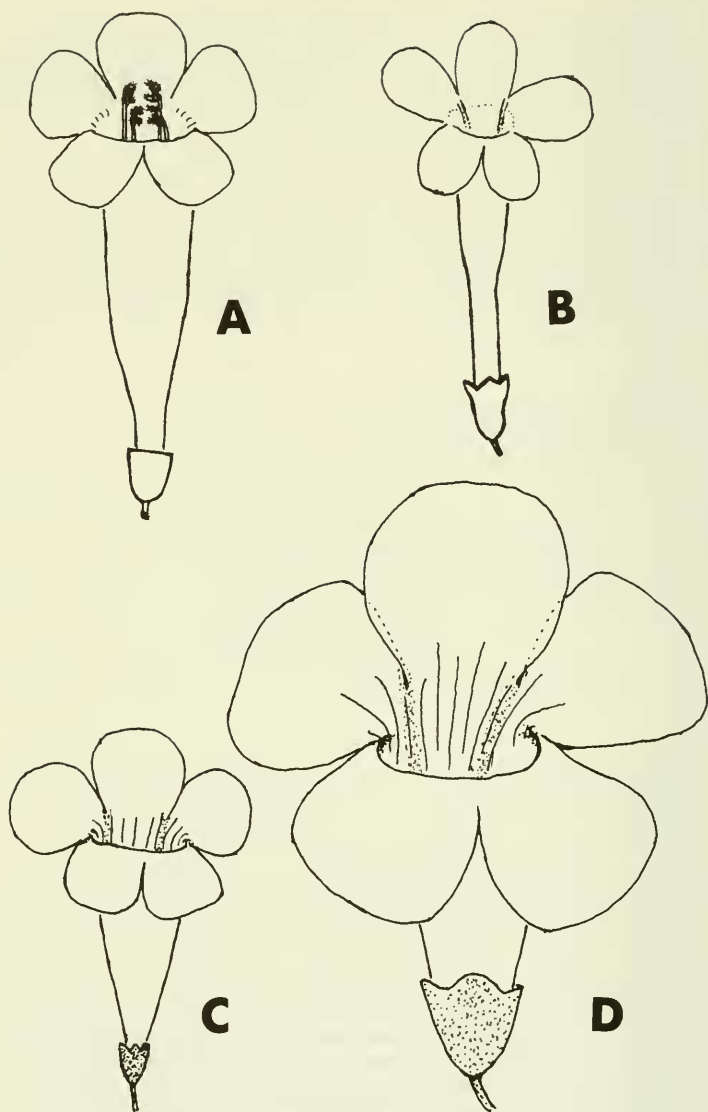


Fig. 2. (opposite). Pachyptera and Tabebuia. A. Flower of P. erythraea (Dugand) A. Gentry--bright red with truncate cupular calyx, broad corolla tube, exerted anthers; B. Flower of P. kerere (Aubl.) Sandw.--white with campanulate shallowly lobed calyx, narrow corolla tube, included anthers. C-D. Tabebuia chrysantha (Jacq.) Nichols. C. Flower of T. chrysantha ssp. chrysantha from coastal dry forest in Ecuador (Gentry et al. 12193); D. Flower of T. chrysantha ssp. pluvicola A. Gentry from Ecuadorian wet forest (Gentry 9505 (MO, type)) (All x 2/3).

Xylophragma is woody and oblong, quite unlike the thin linear fruit of this species. Vegetatively this species is very like Spathicalyx duckei (cf. above) which has similar trifold tendrils, subulate pseudostipules, cordate, more or less palmately-veined never 3-foliolate leaflets, and especially the frequent presence of glands similar to those of "A." xanthophylla except for being stalked. The calyx of both species is membranaceous but that of Spathicalyx is subspathaceous rather than bilabiate split. Both species have very finely reticulate 3-colporate pollen (Tomb and Gentry, in prep.), and 4 phloem arms in stem cross section. Certainly Spathicalyx duckei seems to be the closest relative of "A." xanthophylla. On the other hand the presumably hawk-moth pollinated, elongate tubular flower of S. duckei is white and much longer than that of "A." xanthophylla. Whether this difference justifies segregation of "A." xanthophylla as a monotypic genus is unclear, especially since the fruit of S. duckei is not yet known. In view of the generally too-narrow generic limits and plethora of monotypic genera which traditionally have plagued Bignoniaceae taxonomy (Gentry, 1972), I opt for placement of A. xanthophylla in Spathicalyx with its closest relative despite the major floral differences between the two species. Several other genera (e.g. Arrabidaea, Tabebuia) include both hawk-moth pollinated and bee-pollinated species and the floral differences within such genera are greater than those between S. xanthophylla and S. duckei. It now seems probably that the floral similarities between most species of Bignoniaceae adapted for hawk-moth pollination reflect evolutionary convergence rather than common ancestry. Conversely, the corolla differences associated with different modes of pollination, such as those between S. duckei and S. xanthophylla, may be of less taxonomic significance than generally supposed.

Literature Cited

- Bureau, E. & K. Schum. 1896-97. Bignoniaceae. In Martius, Flora Brasiliensis 8(2).
- Gentry, A. H. 1973. Generic delimitations of Central American Bignoniaceae. Brittonia 25: 226-242.